

# *MIL-STD-810H*

## *METHOD 508.8 – FUNGUS*

*FINAL REPORT: R2019-###*

Prepared for:  
XYZ Corporation  
9 Corporation Parkway  
Anywhere, USA 60014

*Accredited Testing Provided by:*



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TESTING CERT: #2832.01

*Testing Initiated: October 29, 2019*  
*Testing Completed: November 26, 2019*  
*Report Issued: December 4, 2019*

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Approved By: Debbie Koester  
Title: Quality Manager

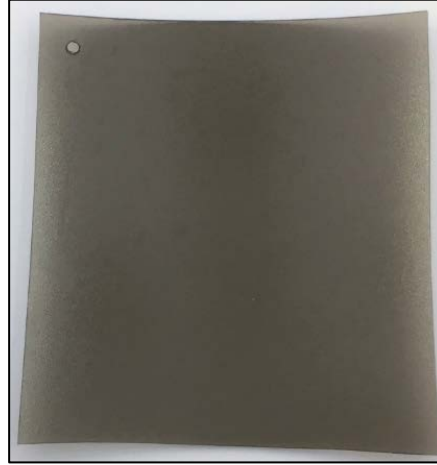


**Objective:**

To assess the susceptibility of materials to fungal growth.

**Test Sample Description:**

Sample 1 - approximately 4" x 4", brown in color, coupon



Sample 2 - approximately 4" x 4", black in color, ridged areas, coupon





### Test Procedure Summary:

The test items were placed in the chamber with minimal contact.

All items were held in the test chamber to precondition to  $30 \pm 2^\circ\text{C}$  and a relative humidity greater than 90% and less than 100% for a minimum of 4 hours prior to inoculation.

After pre-conditioning, items were sprayed with the mixed spore suspension with a sterile atomizer, spraying uniformly until drops began to form on the surface. After spraying, items were placed in the test chamber to begin incubation. Incubation continued for the pre-determined duration. After incubation items were examined for fungal growth and physical effects. Results pertain only to items tested.

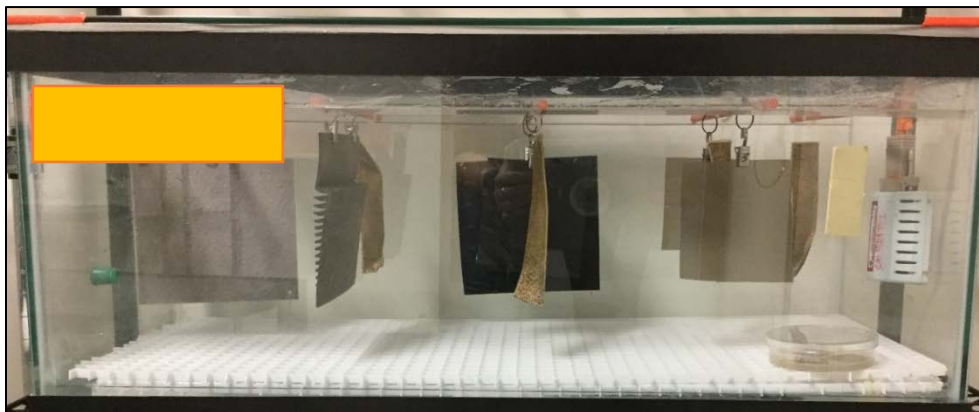
### Test Parameters

<b>Test Organisms in Mixed Spore Suspension:</b>	<i>Aspergillus brasiliensis</i> <sup>1</sup>	ATCC 9642
	<i>Talaromyces pinophilus</i> <sup>2</sup>	ATCC 11797
	<i>Chaetomium globosum</i>	ATCC 6205
	<i>Aspergillus flavus</i>	ATCC 9643
	<i>Trichoderma virens</i>	ATCC 9645
<b>Test Surface:</b>	External Surfaces	
<b>Media Used:</b>	Mineral Salts Solution prepared per method/filter sterilized Mineral Salts Agar prepared per method	
<b>Control Strip Material:</b>	MIL-T-43566, Type 1, Class 1, Commercial	
<b>Pre-cleaning:</b>	Cleaned with 70% reagent grade isopropyl alcohol	
<b>Temperature/Relative Humidity:</b>	$30 \pm 2^\circ\text{C}$ ; greater than 90%, less than 100%	
<b>Incubation Duration:</b>	28 days	
<b>Performance Testing:</b>	None	
<b>Deviations from Method:</b>	Testing performed per MIL-STD-810H Method 508.8 without deviation	

<sup>1</sup> Historically known as *Aspergillus niger*

<sup>2</sup> *Penicillium funiculosum* re-identified as *Talaromyces pinophilus*

Samples in chamber at Day 28

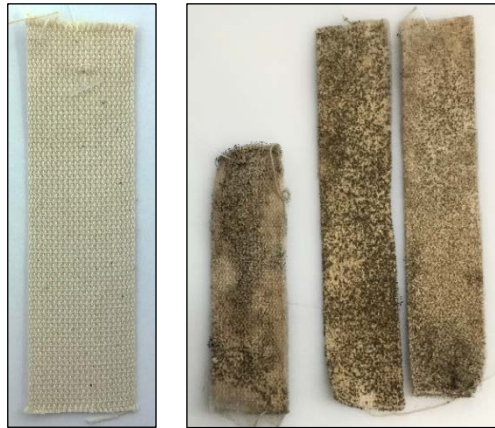




**Control and Conditions Results:**

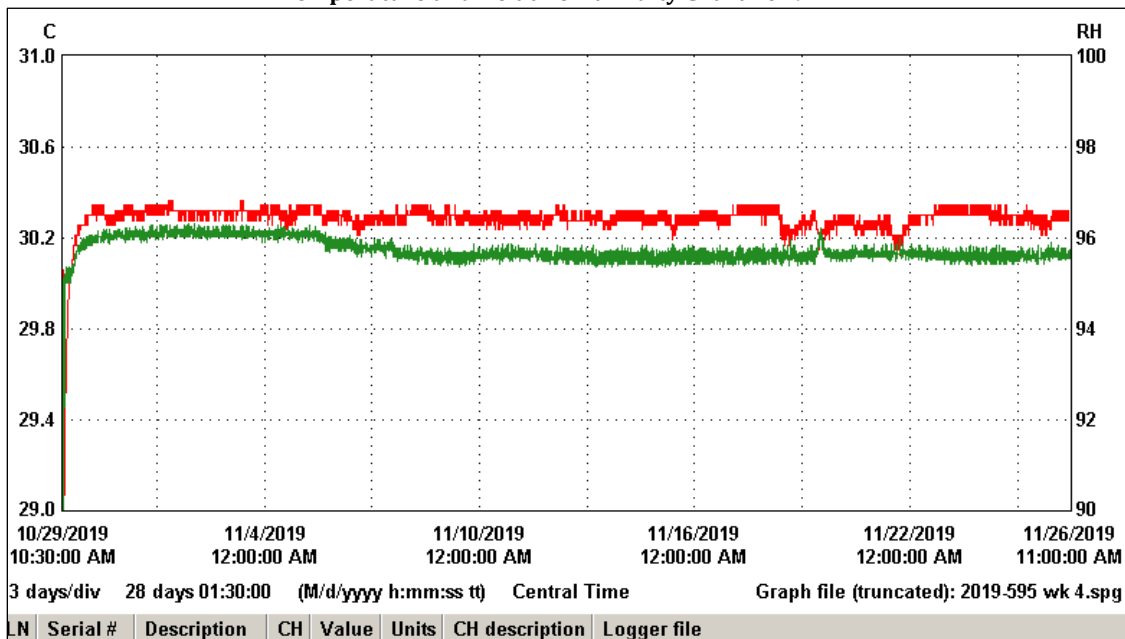
Test Start/End Time

Pre-Condition Start Time:	10/28/2019 at 14:40
Pre-Condition End Time:	10/29/2019 at 10:20
Incubation Start Time:	10/29/2019 at 10:30
Incubation End Time:	11/26/2019 at 11:00



Pictured on the left is a chamber control strip at Day 0. Pictured on the right is a chamber control strip at Day 28. Testing included three control strips. At Day 7, all control strips had acceptable fungal growth to confirm the environment was suitable for fungal growth. At Day 28, all chamber control strips had an increase in fungal growth as compared to Day 7. All viability plates had copious growth after 10 days to confirm viability of the spore suspension.

Temperature and Relative Humidity Chart 2019-###



Temperature and relative humidity were maintained throughout the test period.



## Post-Test Evaluation:

After incubation, test items were examined for any fungal growth. Examination is performed with an unaided eye under good lighting. Any fungal growth is described. The amount of growth is rated using Table 508-II – *Evaluation scheme for visible effects* from the standard.

*Evaluation scheme for visible effects – (Table 508.8-II)*

Amount of Growth	Rating	Comments
None	0	Substrate is devoid of microbial growth.
Trace	1	Scattered, sparse or very restricted microbial growth.
Light	2	Intermittent infestations of loosely spread microbial colonies on substrate surface. Includes continuous filamentous growth extending over the entire surface, but underlying surfaces are still visible.
Medium	3	Substantial amount of microbial growth. Substrate may exhibit visible structural change.
Heavy	4	Massive microbial growth.

Fungal growth is identified using macroscopic and microscopic characteristics. Photographs and location of growth are included to aid in determining specific material supporting growth. Growth that appears to originate from a contaminant from surface deposits of dust, grease, or other contaminants is reported. Items were checked for growth after 7 and 14 days incubation to determine how rapidly the fungus grew.

After visual examination, the simple cleaning process of wiping fungal growth with a quaternary amine (Bac-Down®) was evaluated. Wiping can partially remove the growth but may not completely eliminate the fungus from the test piece.

After wiping, an evaluation of the immediate effects of the fungal growth on the physical characteristics were determined. This includes staining, corrosion, color change, etc.

Long range effects are not evaluated by MicroStar. Considerations of fungal growth on long term effects may include that items should be cleaned before storing. There may be storage issues if there is fungal growth and/or degradation. Cleaning should be considered before storage of items that are stored in high relative humidity in the field or in storage.

Any item with fungal growth may pose a health risk for persons with allergies to mold. Fungus on materiel can be so aesthetically unpleasant that the users will be reluctant to use the materiel.

Tested items will be decontaminated and returned to the customer. The procedure involves applying heat and humidity and is based on Annex A of MIL STD 810H Method 508.8.

Tested items will be disposed of by MicroStar.



**Fungal Growth Results for Sample 1**

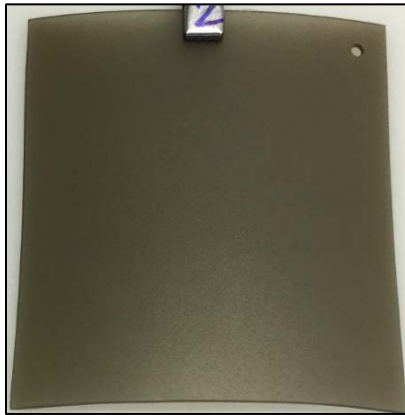
Rating: 1

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Description of Growth:	Growth was not visible on the item at Day 7 and Day 14 Trace, sparse growth on both sides Growth does not appear to originate from contaminates
Species Identified:	<i>A. versicolor</i> <i>T. pinophilus</i>
Physical Evaluation:	Fungus was easily wiped from the surface. No change in physical characteristics noted after wiping.

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Side A - After Testing



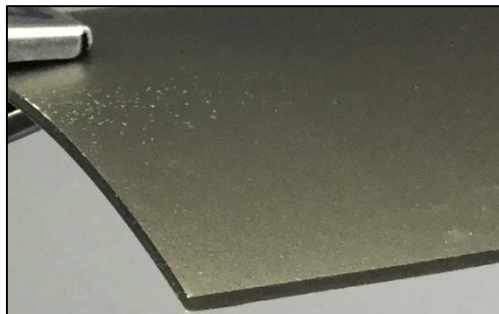
Side A - After Wiping



Side B - After Testing



Side B - After Wiping



**Closer view of the trace growth on the front side of the sample.**





**Fungal Growth Results for Sample 3**

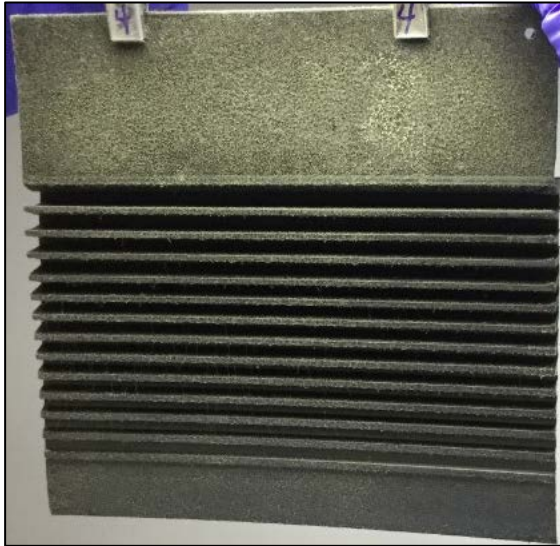
Rating: 3

Description of Growth: Growth was visible on the item at Day 7 and Day 14

Species Identified: *A. brasiliensis*  
*A. flavus*  
*A. versicolor*

Physical Evaluation: Fungus was easily wiped from the surface.  
No change in physical characteristics noted after wiping.

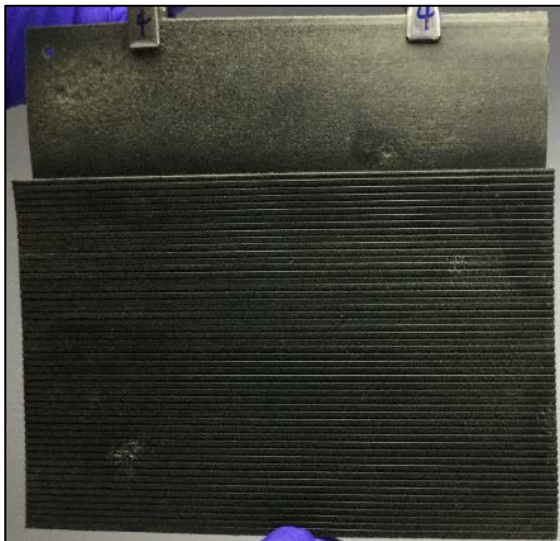
Side A - After Testing



Side A - After Wiping



Side B - After Testing



Side B - After Wiping



Equipment List: 2019-###

Instrument	MSL Asset #	Make	Model	Serial #	Calibration Status	Last	Next
MSL Chamber	MSL-27	N/A	N/A	N/A	N/A	N/A	N/A
Temperature/Relative Humidity Sensor	V34	Vaisala	SP-2000-20R	15502115	Externally calibrated yearly; A2LA accredited ISO/IEC 17025 Calibration Lab Cert# 2083.01	4/16/2019	4/16/2020
Chromatography Atomizer	SP-2	Chemglass	N/A	N/A	Cleaned and sterilized after each use	N/A	N/A
Air Pump	0967	Barnant	Air Cadet 420-3901	G08002770	Maintained as needed	N/A	N/A
Microscope	MICRO1.3-7	Meiji	Various	Various	200X phase contrast/45x stereoscopic image	N/A	N/A
Hemocytometer	HEM-1 HEM-2 HEM-4, HEM-5	Brightline	N/A	N/A	For adjusting spore suspensions	N/A	N/A
Autoclave	Auto 1	Hirayama HICLAVE	HVE-50	30608072451	Verified quarterly using MSL-1042	3rd Quarter (9/25/19)	4th Quarter (12/31/19)
Autoclave	Auto 5	Panasonic	MLS-3781L-PA	PA530147	Verified quarterly using MSL-1042	3rd Quarter (9/18/19)	4th Quarter (12/31/19)
Autoclave	Auto 6	Panasonic	MLS-3781L-PA	PA7Z0211	Verified quarterly using MSL-1042	3rd Quarter (9/11/19)	4th Quarter (12/31/19)
Data Logger	MSL-1042	ACR Nautilus	I35-SS	12130	Externally calibrated yearly; A2LA accredited ISO/IEC 17025 Calibration Lab Cert.#0038.05	2/13/2019	2/13/2020
Balance	Media Balance	A&D Company	FX-300i	15623435	Externally calibrated yearly; A2LA accredited ISO/IEC 17025 Calibration Lab Cert# 3312.01	4/4/2019	4/4/2020
Weight Set	Weights	Troemner	Class 1 SS	100g-0.1g: 71722	Externally calibrated 5 years; NVLAP accredited ISO/IEC 17025 under Lab Code 105013	6/15/2015	6/15/2020
				0.05g: 1000047187			
				0.01g: 1000047888			
pH Electrode	pHP-2	Sartorius	PY-P23	A143106001	Weekly Standardization; A2LA accredited ISO Guide 34	Weekly	
pH Meter	1043	Denver Instruments	Ultra Basic UB-10	UB27353240	Reference Material Producer #883.02		

NA = Not Applicable